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PATENT SPECIFICATION **742,391**



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COMPLETE SPECIFICATION.

Improvements in and relating to Float Valves.

I, LESLIE HADDOW CARMALT, a British Subject, of Briery Hillsfield, Wayside, Chipperfield, Hertfordshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention has reference to improvements in and relating to float valves of the kind in which a plunger is seated and unseated by a bell-crank lever connected to a float arm.

The principal object of the invention is the provision in a valve of the above type of simple and effective means ensuring that when the valve is installed the plunger never occupies a nearly closed position. Hence trickling or dripping of water owing to the plunger being just off its seat and the consequent noise are avoided. A particular advantageous application of the invention is, therefore, to domestic storage cisterns.

In accordance with the invention the connection between the bell crank lever and the float arm comprises an overcentre spring or weight device and a push-pull link, said device comprising a pivoted arm and a spring or weight, the float arm being adapted to displace the spring or weight to one side or the other of the pivotal axis of the said pivoted arm so as to trip the arm towards the corresponding side of the axis and the push-pull link being pivotally connected to the arm and to the bell-crank lever so as to operate the said lever when the arm is tripped and unseat the plunger or seat it according to whether the float is descending or rising.

The float arm may act either directly on the spring or weight or through the intermediary of movement-multiplying means such as gearing or levers.

The invention will now be described with

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reference to the examples shown in the accompanying drawings wherein:

Fig. 1 is a side elevation of a float valve installed in, say, a domestic tank x wherein the float arm acts directly on the overcentre spring, the valve being closed.

Fig. 2 shows the parts of the overcentre spring device illustrated in Fig. 1 in the position they occupy when the valve is open.

Figs. 3 and 4 correspond respectively to Figs. 1 and 2 save that the float arm acts on the overcentre spring device through movement-multiplying gearing.

In Figs. 1 and 2 the float arm 1 is pivoted at 2 to the outer end of a fork or pair of parallel fingers 3 extending from the body 4 of the valve in the general direction of the ball-float 5. On the pivot 2 is the arm 6 of an overcentre spring device generally indicated by 7, said arm 6 extending in the general direction of the valve body 4; and the spring 8 (of tension type) is attached by pivots 9 and 10 at its ends to the arms 1 and 6 at points spaced from the pivot 2. The arm 6 is pivotally connected to a downwardly directed push-pull link 11 by the pivot 10 which link is in turn pivotally connected to a bell crank lever 12 operating on the plunger of the valve in the usual way. In this assembly the arrangement is such that shortly after the float commences to descend (from the Fig. 1 position) the spring end attached to the float arm 1 is pulled below the axis of the pivot 2 and immediately thereafter the spring displaces the arm 6 and this latter arm shifts the bell crank 12 through the push-pull link 11 to cause the plunger to be quickly unseated (Fig. 2). When the water rises to its original level the overcentre device is tripped back and the plunger is quickly seated (Fig. 1). The arm 6 and the link 11 have rows of holes 13 so that the pivot 10 connecting them together may be located at any one of

a number of points along the length of the arm and link for adjusting the sensitivity of the device 7.

In Figs. 3 and 4 the spring 8 of the over-centre spring device 7, instead of being directly connected to the float arm 1, is connected thereto by a finger 14 and toothed gearing which imparts to the finger a magnified angular movement in relation to the float arm. The said gearing comprises a toothed wheel 15 (it may be a toothed segment) borne by the pivot 16 of the float arm, an idler wheel 17 in mesh with the wheel 15 and a toothed wheel 18 with which the idler meshes, said wheel 18 being of smaller diameter than the wheel 15. The pivot 16, the shaft or pivot 19 of the wheel 17 and the shaft or pivot 20 of the wheel 18, which pivot 20 is also the pivot for the finger 14, are borne by the fingers or fork 3. The wheel 15 is fixed in relation to the arm 1; the wheel 18 is fixed in relation to the finger 14.

As the ball float 5 falls from the position shown in Fig. 3 the finger 14 turns clockwise at a greater angular rate than the arm 1 and the overcentre spring device 7, in the early part of the descent of the float, trips to the position shown in Fig. 4, thereby opening the valve with a snap action. Conversely, the valve is closed with a snap action by the overcentre spring device when the float rises to the position shown in Fig. 3.

What I claim is:—

1. A float valve of the kind in which a

plunger is seated and unseated by a bell-crank lever connected to a float arm, wherein the connection between the bell-crank lever and the float arm comprises an overcentre spring or weight device and a push-pull link, said device comprising a pivoted arm and a spring or weight, the float arm being adapted to displace the spring or weight to one side or the other of the pivotal axis of the said pivoted arm so as to trip the arm towards the corresponding side of the axis and the push-pull link being pivotally connected to the arm and to the bell-crank lever so as to operate the said lever when the arm is tripped and unseat the plunger or seat it according to whether the float is descending or rising.

2. A float valve according to Claim 1, wherein the float arm is adapted to displace the spring or weight through movement-multiplying means.

3. A float valve according to Claim 1 or 2, wherein the pivotal connection between the push-pull link and the pivoted arm is adjustable along the length of the said link and arm.

4. A float valve substantially as herein described and shown in Figs. 1 and 2 of the accompanying drawings.

5. A float valve substantially as herein described and shown in Figs. 3 and 4 of the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in and relating to Float Valves.

I, LESLIE HADDOW CARMALT, a British Subject, of Briery Hillsfield, Wayside, Chipperfield, Hertfordshire, do hereby declare this invention to be described in the following statement:—

This invention has reference to improvements in and relating to float valves, more particularly but not exclusively to valves wherein the float is mounted on a lever adapted to open and to close the valve.

The principal object of the invention is the provision of a valve which is either fully open or fully closed so that trickling or dripping of water when the valve is partially open or partially closed and the consequent noise is avoided. A particularly advantageous application of the invention is, therefore, to domestic storage cistern.

The invention resides in the provision in a float valve of an overcentre spring or weight device in the connection between the float and the valve plunger or the like, the float being arranged to trip the spring or

weight device in either direction and the said device being arranged when tripped to unseat or to seat the plunger according to whether the float is descending or rising.

Conveniently the overcentre device is of pivoted arm and spring type, an element moved by the float, such as the float arm of a ball valve, being arranged to pull one end of the spring to one side or the other of the axis of the pivot, the spring being connected at one end to the pivoted arm. The float arm or the equivalent may act either directly on the spring or through the intermediary of movement multiplying means such as gearing or levers.

In one way of carrying out the invention in connection with a float valve of the type comprising a float on a pivoted arm as used in, say, domestic tanks, the arm is pivoted to the outer end of a fork or pair of parallel fingers extending from the body of the valve in the general direction of the float. On the same pivot as that of the arm

is the arm of an overcentre spring device, said arm extending in the general direction of the valve body; and the spring (of tension type) is attached at its ends to the arms (the arm of the overcentre device and float arm) at points spaced from the pivot. The arm of the overcentre device is pivotally connected to a downwardly directed push-pull link which is in turn connected to a bell-crank lever or the like operating on the plunger of the valve. In this assembly the arrangement is such that shortly after the float commences to descend the spring end attached to the float arm is pulled below the pivot axis and immediately thereafter the spring displaces the arm of the overcentre device and this latter arm shifts the bell-crank or the like through the push-pull links to cause the plunger to be quickly unseated. When the water rises to its original level the overcentre device is tripped back and the plunger is quickly seated.

In a modification of the above arrangement the spring instead of being directly connected to the float arm may be connected to the outer end of a finger mounted coaxially of the pivot for the arm of the overcentre spring device, said finger being adapted to be displaced by the float arm through the intermediary of toothed gearing or a lever mechanism which imparts to the finger a magnified angular movement in relation to the float arm. Such gearing may comprise a toothed wheel or segment, arranged to be directly turned by the float arm, meshing with an idler which in turn meshes with a toothed wheel of smaller radius than the first toothed wheel or segment, said smaller wheel being fixed to the finger so as to turn same when the segment or the like is turned by the float arm. The axles or spindles of the toothed elements are borne by the parallel fingers referred to in the immediately preceding paragraph, the small toothed wheel being near the outer or free end of the fingers.

The arm of the overcentre spring device and the push-pull link may each have a row of pivot holes so that the pivot connecting them together may be located at any one of a number of points along the length of the arm and link.

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742,391 COMPLETE SPECIFICATION

1 SHEET

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